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Hydrodynamic aspects of boiling up of a disperse phase in a homogeneous turbulent flow of an emulsion

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Abstract

Hydrodynamic aspects of boiling up of a disperse phase in a homogeneous turbulent flow of an emulsion is studied. It is assumed that the disperse-phase drops of an emulsion are metastable, but their temperature is insufficient for stable spontaneous nucleation having a fluctuation nature. Drops with typical size exceeding the turbulence microscale capable of boiling up are considered. The maximum velocities arising in the resonance oscillations of drops with the diameter of 1 and 100 μm and amplitude of the oscillations equal to the diameter of the drop of the water-organosilicon liquid PES-5 emulsion are estimated. The time delays of boiling up of the emulsion show that the probability of initiated boiling up is quite high. In the presence of the disperse phase of the zones of local vacuum in the volume and negative pressure, drops in a definite size range can boil up without a time delay.

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